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Publication date:
2012

Document version
Publisher's PDF, also known as Version of record

3D Seismic Mapping of Magmatic Intrusive Bodies in the Faroe-Shetland Basin

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The sedimentary section of the Faroe-Shetland Basin is strongly influenced by the magmatic events of the North Atlantic Tertiary Igneous Province. The western part of the basin is covered by extrusive volcanic lava whereas numerous magmatic sills known as the Faroe-Shetland Sill Complex are prominent in central and eastern part. The sill complex has primarily been intruded into the Upper Cretaceous and Palaeogene sedimentary succession.

With new high quality and high resolution 3D seismic, acquired in 2008 and 2009, it is possible to perform detailed interpretations of sill morphology and their internal structures. In the study area a large complex 6,3 x 5,0 km was mapped in detail. The mapped complex is displayed on 2D map views, and 3D figures are constructed from converted horizons. Based on the detailed interpretation it is possible to analyse morphology and flow patterns and determine a spatial connections between individual intrusions. It is concluded that the intrusions in the mapped complex are connected in a larger intrusive system, and hence emplaced from one intrusive event.

Finally a new emplacement mechanism the 'bullet-hole' emplacement hypothesis is introduced, which is suggested as an emplacement mechanism for *cup-shaped* sills.

A hydrothermal vent created on the seafloor directly as a consequence of the intrusive event by explosive eruptions of gasses, liquids and sediments, is used to determine the age of the intrusive system, by using well ties and biostratigraphic markers.